An analytical second-FDTD method for evaluation of electric and magnetic fields at intermediate distances from lightning channell

ABSTRACT

Evaluation of electric and magnetic fields due to lightning discharge is important in determination of lightning induced voltage and power system protection especially to the distribution system. In this paper, by using dipole method, Maxwell equations and second order finite-difference time domain (later referred as a 2nd FDTD method) on two realistic return stroke currents, an algorithm for evaluation of electric fields is proposed, which is based on numerical methods in the time domain. Besides proving greater accuracy, it also allows the evaluation of electric and magnetic fields away from lightning channel. In addition, the comparison between simulation results and measured fields' wave shape showed that the proposed algorithm is in good agreement for evaluation of electric and magnetic fields due to lightning channel.

Keyword: Electric; Magnetic fields; Lightning